SMIRNOV, A. A., BUTYLANKO, A. K., DANILENKO, V. M., MILNAN, YU. V., NAYDICH, YU. V., AND BYDAK, S. A.

Theory of Electric Resistance of Alloys in Progressing Order
Izv. Kivevsk. politekhn. in-ta, 12, 1953, pp 18-24

Experimental curves, expressing ratio of electric resistance of alloys in progressing order to compound and distant order, differ from theoretical ones by presence of rectilinear sections, sharp maximums and uneven variations. These peculiarities are theoretically explained in examples of alloys with cubic lattices. The article confirms A. A. Smirnov's theory Zhur Elks i Theor Fiz 17, 743 (1947) of peculiarities observed in alloys in progressing order. (RZhFiż,. No 5, 1955)

SO: Sum No. 639, 2 Sep 55

SMIRNOV, A.A

USSR.

Diffusion in ternary alloys. A. A. Smirnov. *Zhur. Tekh. Fiz.* 23, 50–65 (1953). —A theory was developed for the diffusion of marked atoms in a homogeneous, substitutional, ternary, body-centered cubic solid soln. A vacancy mechanism was assumed, and only nearest-neighbor interactions were considered. The equil. concn. of vacancies was expressed as a function of the concn. of the solid soln., then the potential barrier to the transfer of an atom to a neighboring vacancy was also found as a function of concn., and finally the diffusion coeff. was detd. The variation of the activation energy with compn. was considered, and in the case of a binary alloy the activation energy would be expected to pass through a max. if the alloy tended to order and through a min. if the alloy tended to decomp. into 2 phases.

A. G. Guy

M

SMIRNOV A.A.

USSR

539.217

10548. Theory of the diffusion of extraneous atoms in alloys during the process of ordering. I. M. A. KRIVOGLAZ AND A. A. SMIRNOV. *Zh. eksper. teor. Fiz.*, 24, No. 4, 409-[illegible] (1953). In Russian.

Discusses the problem of the diffusion of atoms inserted into the interstices of the body-centred crystal lattice of binary alloys, e.g. β-brass, during the ordering process. All possible configurations of the alloy atoms surrounding the diffusing atoms of the extraneous element are taken into consideration. A derivation is presented of theoretical dependence of the coefficient of diffusion on temperature and concentration for both the ordered and disordered state of the alloy.

F. LACHMAN

SMIRNOV, A. A.

17

6746

THEORY OF THE DIFFUSION OF EXTRANEOUS ATOMS IN ALLOYS DURING THE PROCESS OF ORDERING. II. M. A. Krivoglaz and A. A. Smirnov. Zhur. Eksptl'. i Teoret. Fiz. 24, No. [redacted]. (In Russian)

The problem of the diffusion of atoms inserted into the interstices of a face-centered crystal lattice of binary alloys, e.g., $AuCu_3$, during the disorder-order transition is discussed. The temperature and concentration dependence of the coefficient of diffusion is investigated for both the ordered and disordered state of the alloy. The effect of the disorder-order transition on the coefficient of diffusion is found to be greater for the face-centered than for the body-centered alloy lattices. (Science Abstracts)

1. SMIRNOV, A. A.

2. USSR (600)

4. Alloys

7. Oxidation of alloys. Zhur. fiz. khim. 27, no. 1, 1953.

9. Monthly List of Russian Accessions, Library of Congress, May 1953. Unclassified.

SMIRNOV, A.A.

Effect of vacancies in crystal lattice units on electric resistance of an alloy. Dop. AN URSR no.4:250-255 '54. (MIRA 8:4)

1. Chlen-korrespondent Akademii nauk USSR. 2. Kiivs'kiy politekhnichniy institut.
(Metallography) (Electric resistance)

Smirnov, A. A.

USSR

Effect of interstitial atoms on the self-diffusion of a metal. M. A. Krivoglaz and A. A. Smirnov. *Doklady Akad. Nauk S.S.S.R.* 96, 495-8(1954).—The strong dependence of self-diffusion of γ-Fe on C content is explained theoretically. The equil. no. of vacancies with 0, 1, 2, 3, 4, 5, and 6 neighboring interstitial atoms was calcd. by a statistical method. An expression for the diffusion coeff. D of marked matrix atoms was then obtained in terms of the self-diffusion coeff. D_A in pure matrix metal A, the concn. c of the interstitial atom C, the interaction energy B of atoms A and C at a distance $a_0/2$, and the difference of interaction energies b for distances $(\sqrt{2}/4)a_0$ and $a_0/2$, where a_0 is the lattice const. $D = D_A[1/(1 - c)][1 + c(e^{B/kT} - 1)]^4 [1 + c(e^{(B-b)/kT} - 1)]^2$. Thus, D did not vary exponentially with $1/T$. However, approx. the observed expti. values of activation energy and frequency factor were obtained for $B = 0.45$ e.v., $B - b = 0$, and $c = 2$ to 5 at. %. The frequency factor decreased by a factor of 100 with increase in c from 0 to 2.5 at. %. A. G. Guy

SMIRNOV A. A.

3
462c

The possibilities of using electric resistance to detect holes at the nodes of crystalline lattice of metals and alloys. A. A. Smirnov. *Trudy. Kiev. Politekh. Inst.* 15, 57-67 (1954). *Referat. Zhur., Met.* 1956, Abstr. No. 7812; cf. *C.A.* 49, 13764e.—The effect of holes on the sp. residual elec. resistance of binary alloys of the substitutional type with cubic crystal lattice was studied. In the detn. of this resistance, holes are considered as atoms of addnl. components. The relation thus obtained of addnl. resistance of the alloy connected with the appearance of holes to the relative concn. of one of the atoms in the alloy shows that in alloys capable of order the addnl. resistance could not have max. at any concn., and in alloys capable of disorder such max. could occur. If further addn. of a small amount of metal *A* decreases the equil. value of the holes at temp. T_0, then it would be possible that the residual elec. resistance after tempering from T_0 will be smaller than for pure metal *B*. This effect is most probable, if the alloy *A-B* is capable of becoming ordered. The presence of holes distorts the effect of temp. on elec. resistance. A. N. Pestoff

1/1

FD-1072

USSR/Physics - Diffusion in alloys

Card 1/1 Pub. 153 - 8/24

Author : Smirnov, A. A.

Title : Diffusion into penetrated alloys

Periodical : Zhur. tekh. fiz., 24, No 10, 1802-1811, Oct 1954

Abstract : The author calculates the diffusion coefficient of atoms penetrating into intermediate nodes of the body-centered cubic lattice of a binary alloy which may be in the ordered state.

Institution : -

Submitted : May 3, 1952

SMIRNOV, A.A.

Theory of the diffusion of interstitial atoms in self-ordering alloys. II. M. A. Krivoglaz and A. A. Smirnov (Lab. Metal Phys., Akad. Sci. Ukr. S.S.R., Kiev.). *Zhur. Eksptl. i Teoret. Fiz.* 27, 673-80(1954); cf. *C.A.* 49, 2142i.—The diffusion of interstitial atoms in self-ordering alloys with the face-centered $AuCu_3$ lattice is calcd.; the interstitial atoms are located either in the center of the cubic cells or at the centers of sides. Calcns. show that in this type of alloy at the temp. of the transition ordered-disordered diffusion and activation energy change discontinuously.
S. Pakswer

62

1

SMIRNOV, A. A., KRIVOGLAZ, M. A.

"The Effect of Admixtures of Implanted Atoms on Alloy Dissociation"

an article in the book "Questions of the Physics of Metals and Metal Science", AS Ukr. SSR Kiev, 1955, 151 pp.

So: Sum. No. 1102, 19 Oct 56

SMIRNOV, A.A.

The theory of electron movement in the crystal lattice of orderly arranged crystals. A. A. Smirnov. *Dopovidi Akad. Nauk Ukr. R.S.R.* 1960 [illegible]. A theory is developed of a moving electron in a binary crystal lattice of a crystal in the process of becoming orderly arranged. Calcns. are made for the case of the approach of an almost free electron. W. M. Sternberg

PH

Smirnov, A. A.

USSR/Physical Chemistry. Thermodynamics, Thermochemistry, B-8
Equilibria, Physical-Chemical Analysis, Phase Transitions.

Abs Jour: Ref Zhur-Khimiya, No 5, 1957, 14683

Author : M. A. Krivoglaz, A. A. Smirnov
Inst : -
Title : On the Theory of Disintegration of Alloys Accompanied by A Separation of Chemical Compound.

Orig Pub: Fiz. metallov i metallovedeniye, 1955, 1, No 2, 311-315

Abstract: The paper contains the thermodynamic computation of the general case of disintagration of an alloy of two metals, in the crystal lattice of which atoms of a third element have been introduced; this disintergration consists in the formation of a chemical compound of this third element with the metals and a solid solution of an altered composition. The computation of the first phase representing the solid solution is carried out statistically taking into consideration only the configuration part of the free energy. It is assumed that the disintegrating

Card 1/2

USSR/Physical Chemistry. Thermodynamics, Thermochemistry, B-8
Equilibria, Physical-Chemical Analysis, Phase Transitions.

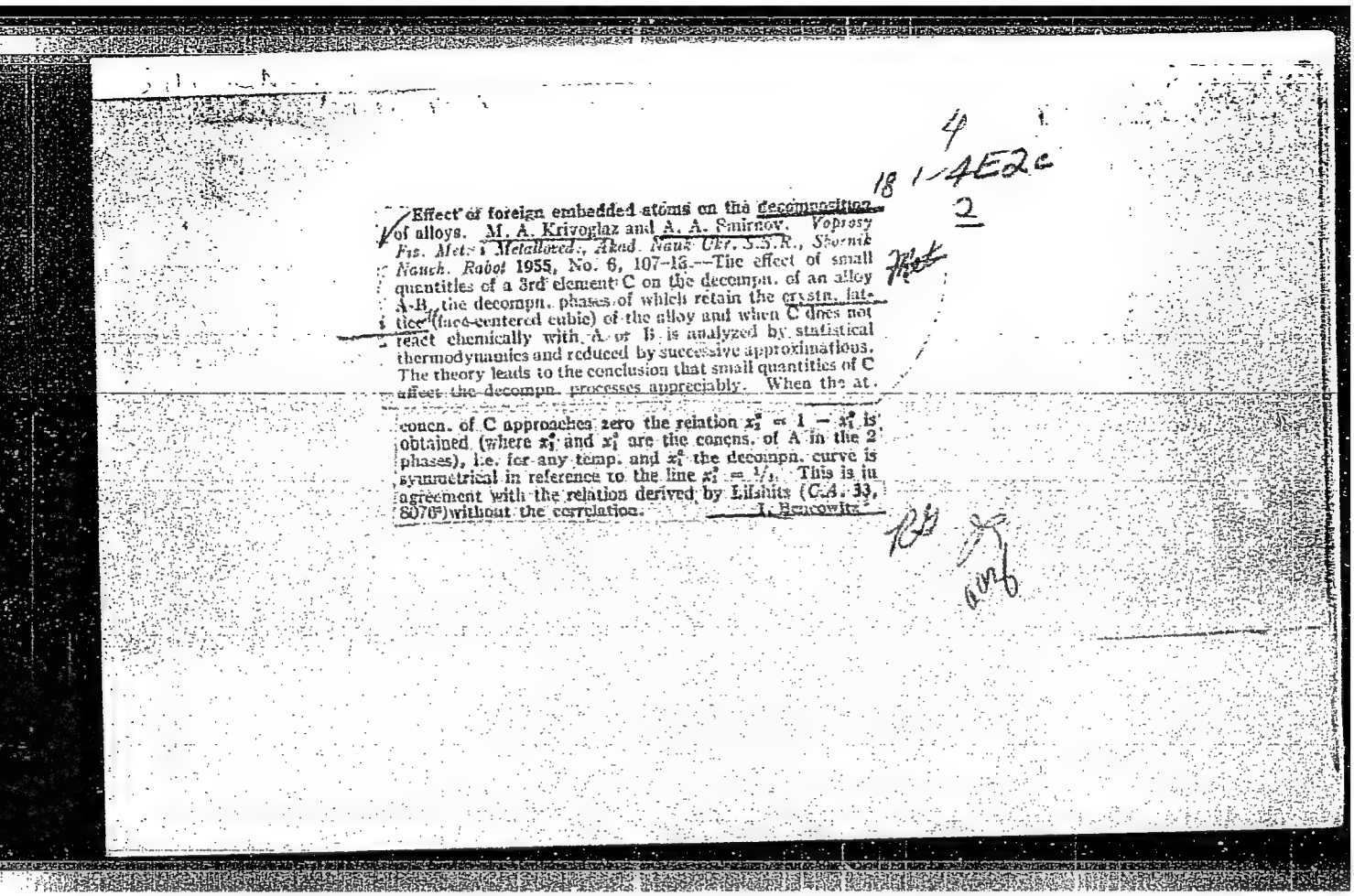
Abs Jour: Ref Zhur-Khimiya, No 5, 1957, 14683.

Abstract: alloy has a face-centered cubic lattice and that the interaction energy of atoms does not depend on the temperature and composition of the alloy.

Card 2/2

Smirnov, A. A.

G-4



Effect of foreign embedded atoms on the decomposition of alloys. M. A. Krivoglaz and A. A. Smirnov. *Voprosy Fiz. Metal. i Metalloved., Akad. Nauk Ukr. S.S.R., Sbornik Nauch. Rabot* 1955, No. 6, 107–13.—The effect of small quantities of a 3rd element C on the decompn. of an alloy A-B, the decompn. phases of which retain the crystn. lattice (faces-centered cubic) of the alloy and when C does not react chemically with A or B is analyzed by statistical thermodynamics and reduced by successive approximations. The theory leads to the conclusion that small quantities of C affect the decompn. processes appreciably. When the at. concn. of C approaches zero the relation $x_1^2 = 1 - x_1^1$ is obtained (where x_1^1 and x_1^2 are the concns. of A in the 2 phases), i.e. for any temp. and x_1^2 the decompn. curve is symmetrical in reference to the line $x_1^1 = 1/2$. This is in agreement with the relation derived by Lifshits (*C.A.* 33, 8070f) without the correlation. I. Bencowitz

SMIRNOV, A.A.

3

*Influence of Additions of Impurity Atoms on the Decomposition of Alloys. M. A. Krivoglaz and A. A. Smirnov (*Zhur. Fiz. Khim.*, 1955, 29, (8), 1532–1534). [In Russian]. A letter. Math. analysis of the factors influencing the reactions between components of binary alloys and the atoms of impurities shows that even small concentration of such atoms can change considerably the decomposition temp. of alloys. If atoms of impurities (C) have lower energy of interaction with atoms A than with atoms B of the binary alloy A–B, then the addn. of C can move the max. of the math. extrapolated curve $T = T_0 + \Delta T$ to the right or to the left.—A. W.

2 Struct Math

RJ MT

Smirnov, A.A.

USSR/Physics - Diffusion in metals

Card 1/2 Pub. 118 - 4/8

Authors : Krivoglaz, M. A., and Smirnov, A. A.

Title : A theory of atomic diffusion in alloys

Periodical : Usp. fiz. nauk 55/3, 391-442, Mar 1955

Abstract : An explanation of the diffusion phenomena is presented. Two theories (out of three mentioned) on the atomic diffusion are discussed. One theory explains the diffusion phenomena as the atom movements along the lattice inter-sites. The theory considers two types of cubical structure crystals: 1. of the β-brass crystals with regularly and irregularly arranged atoms;

Institution: .....

Submitted : .....

Card 2/2 Pub. 118 - 4/8

Periodical : Usp. fiz. nauk 55/3, 391-442, Mar 1955

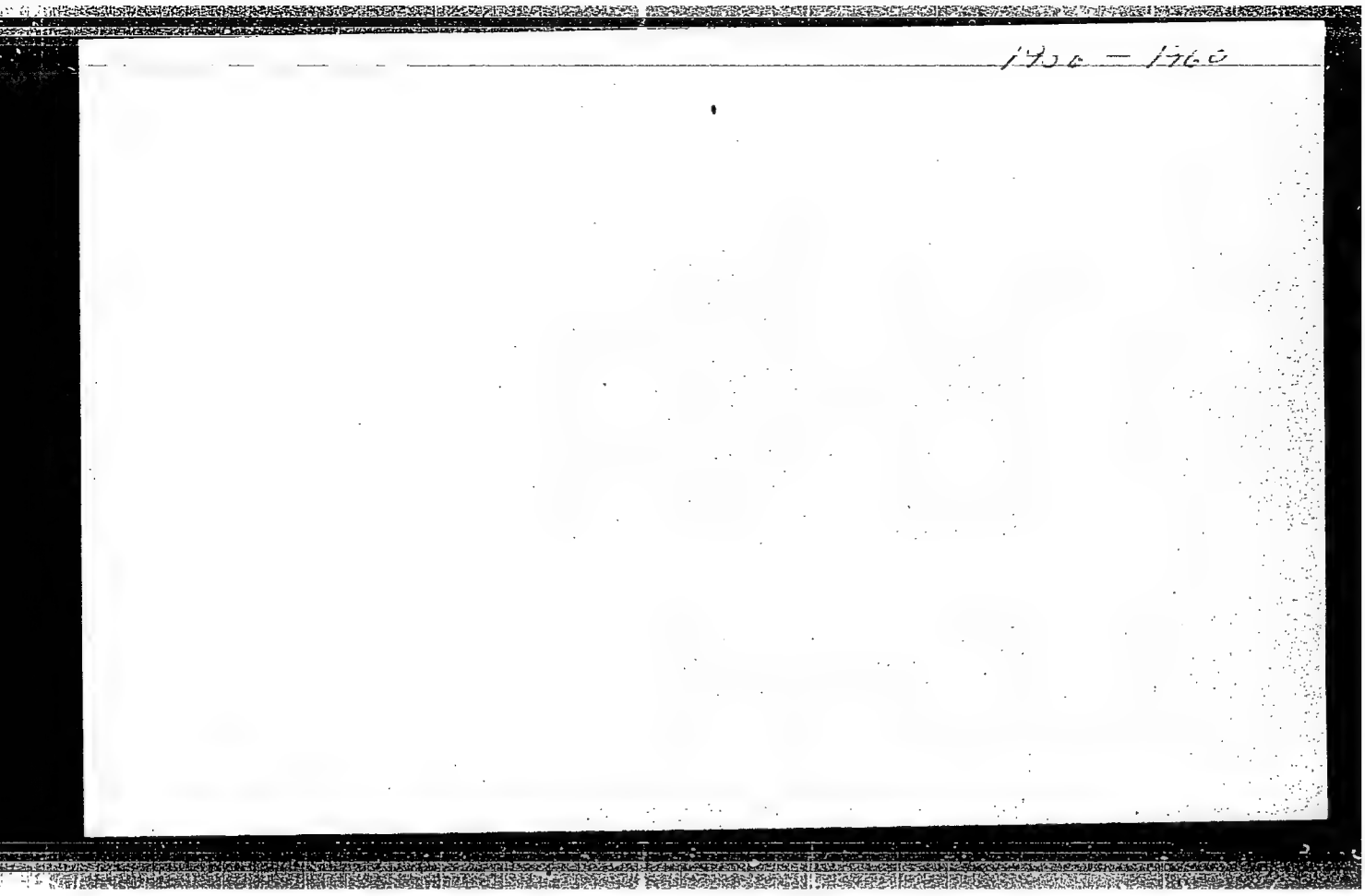
Abstract : and 2. of the Fe_3Al type. The other theory explains the diffusion phenomena as the atom movements along the vacant lattice sites. Methods for determining diffusion coefficients are presented. The dependance of these coefficients on temperature and crystal concentration is discussed and formulae for the coefficients are derived. The so-called self-diffusion phenomenon in the regular or irregular crystals are also discussed. Twenty-nine references: 25 USSR and 8 USA. Graphs; diagrams.

SMIRNOV, A. A.

USSR

10745* Theory of Diffusion of Atoms in Alloys. Teoriia diffuzii atomov v splavakh. (Russian.) M. A. Krivoglaz and A. A. Smirnov. *Uspekhi Fizicheskikh Nauk*, v. 60, no. 3, Mar. 1955, p. 391–442.

Diffusion effected by vacancy mechanism interstitially in crystal lattice; equations for determining diffusion coefficient in alloys of β-brass, Fe_3Al, etc. Diagrams, graphs. 29 ref.



SMIRNOV, A.A.

"The theory of the residual electric resistance of embedded alloys. A. A. Smirnov, and I. O. Stoyanov (Polytech. Inst., Kiev). *Ukrain. Fiz. Zhur.*, 1, 423-30, Russian summary 430-31(1956).—On the basis of a polyelectronic model of metals there is detd. the function of the residual elec. resistance of embedded alloys as a sum which contains parameters of higher order for current nodes and correlation parameters which characterize the occupation of the nodes and of the internodal spaces by the atoms of various kinds. Werner Jacobson

Abs Jour : Ref Zhur - Fizika, No 3, 1957, No 6625

Author : Smirnov, A.A., Stoyenov, I.A.
Inst : Kiev Polytechnic Institute, USSR
Title : Influence of Injected Atoms on the Ordering of the Alloy

Orig Pub : Fiz. metallov i metallovedeniye, 1956, 2, No 3, 524-530

Abstract : The influence of admixture of injected atoms on the ordering of an alloy, having a volume-centered cubic lattice, was investigated periodicelly. It was shown that the presence of an admixture of injected atoms increases the degree of ordering of the alloy and increases the ordering temperature. The possibility of ordering the disordered alloy by injecting admixture atoms into the interstices of its crystalline lattice is clarified. The distribution of the injected atoms of the admixture over the interstices of a different kind in the ordering of the alloy is investigated.

Card : 1/1

SMIRNOV, A.A.

USSR/Electricity - Conductors G-4

Abs Jour : Ref Zhur - Fizika, No 1, 1958, 1390

Author : Krivoglaz, M.A., Smirnov, A.A.
Inst : -
Title : Concerning the Dependence of the Residual Electric Resistivity of an Alloy on the Composition and on the Degree of Ordering.

Orig Pub : Sb. nauch. rabot In-ta metallofiz. AN USSR, 1956, No 7, 115-117

Abstract : Without employing the concept of the mean free path and without assuming the energy of the electron to be independent of the direction of the wave vector, but within the framework of the single-electron approximation, the known relations for the resistance of an alloy were derived for the following two cases: (1) for a binary ordered alloy without allowance for the correlation -- the dependence on the concentration of the component

Card 1/2

SMIRNOV, A.A.

Theory of the electrical resistance of alloys. Ukr.fiz.zhur. 2 no.3:211-225 Jl-S '57. (MIRA 10:10)

1.Institut metalofiziki AN URSR.
(Alloys--Electrical properties)

DANILENKO, V.M.; KRIVOGLAZ, M.A.; MATYSINA, Z.A.; SMIRNOV, A.A.

Theory of wave dispersion by the crystal lattice of solid solutions. Fiz. met. i metalloved. 4 no.1:28-35 '57. (MIRA 10:6)

1. Institut metallofiziki Akademii nauk USSR.
(Wave mechanics) (Crystal lattices)

AUTHORS: Smirnov, A. A. and Stoyanov, I. A. 126-2-7/30

TITLE: Theory of the residual electric resistance of interstitial alloys. (Teoriya ostatochnogo elektrosoprotivleniya splavov vnedreniya).

PERIODICAL: "Fizika Metallov i Metallovedeniye" (Physics of Metals and Metallurgy), Vol.IV, No.2, 1957, pp.228-231 (U.S.S.R.)

ABSTRACT: Up to now authors have dealt mainly with the theory of the residual electric resistance of substitution type alloys (1-6). The aim of this paper is to investigate the relations governing the residual electric resistance of interstitial alloys as a function of the composition, the distant order parameters and the correlation parameters (which characterise the near order relations) between the substituted atoms of various types of nodes and interstices. The calculation was effected on the basis of the multi-electron theory, using a method which was described by this author and his team in other work (3-5). The following simplifying assumptions were made: the potential energies of the conductivity electrons differ little in the field of the ions of the differing type which substitute the nodes of the lattice, and that the potential energies in the field of the ions which

126-2-4/35

AUTHORS: Dykhne, A.M., Matysina, Z.A., and Smirnov, A.A.

TITLE: Theory of residual electric resistance of multi-component ordering alloys. (Teoriya ostatochnogo elektrosoprotivleniya mnogokomponentnykh uporyadochivayushchikhsya splavov).

PERIODICAL: Fizika Metallov i Metallovedeniye, 1957, Vol.5, No.2, pp. 220-229 (USSR)

ABSTRACT: The theory of residual electric resistance of alloys has so far been developed only for certain particular cases. Nordheim (Ref.1) evolved such a theory with single electron approximation, without taking into consideration correlations for disordered multi-component alloys and Smirnov, A.A. (Ref.2) evolved such a theory for ordering alloys with any lattice of the Bravais type in the disordered state. Ryzhanov, S. (Ref.3) has taken into consideration correlation for ordering alloys with a simple cubic lattice. In all the here mentioned work the usual assumptions of the single electron approximation have been made which are unjustified and are associated with introducing the length of free travel, the character of the energy spectrum of the conductivity electrons, etc., which are not really required for deriving relations

Card 1/4

Theory of residual electric resistance of multi-component ordering alloys.

expressing the dependence of the residual electric resistance on the composition, the parameter of the long range order and the correlation parameters (see Krivoglaz and Smirnov (Ref.4)). Within the framework of the multi-electron theory of metals, the residual electric resistance was calculated in earlier work (Ref.5) for binary ordering alloys, taking into consideration the correlation in the first coordinate sphere and in other work (Ref.6) for ternary disordered alloys, taking into consideration the correlation along all the coordinate spheres. The aim of this paper is to evolve a more general multi-electron theory of the residual electric resistance of multi-component ordering substitution alloys with any Bravais type crystal lattice in the disordered state, which, in the ordered state, have any number of types of nodes, taking into consideration correlations in all the coordinate spheres. The authors did not aim to determine the numerical values of the electric resistance and they limited themselves to deriving relations expressing the dependence of the

126-2-4/35

Theory of residual electric resistance of multi-component ordering alloys.

residual electric resistance on the composition and also on the parameters characterizing the distant order and the correlation in the alloy. Therefore, in the same way as in the earlier work (Refs.5,6), the authors succeeded in carrying out their calculations with a minimum number of model conceptions. In addition to taking into consideration the properties of the translatory symmetry, it was assumed that the potential energies of the conductivity electrons in the field of ions of a different type differ little from each other and that the potential of the electric field in the metal is so small that the Ohm law applies. Thereby, the calculation of the residual electric resistance can be carried to finality only if the atom concentrations of all the components except two are small. The subject matter is dealt with under the following headings: Calculation of the probability of transition of the system of electrons from one state to the other; determination of the dependence of the residual electric resistance of an alloy on its composition, the distant order parameters and the correlation parameters

Card 3/4

alloy taking correlation into consideration).
There are 7 references, 6 of which are Slavic.

SUBMITTED: May 3, 1956.

ASSOCIATION: Institute of Metal Physics, Ac. Sc. Ukrainian SSR (Institut Metallofiziki AN USSR)

AVAILABLE: Library of Congress.

Card 4/4

SMIRNOV, A.A.

21-5-11/26

AUTHORS: Geychenko, V.V.(Heychenko, V.V.) Corresponding Member of the AN Ukrainian SSR and Smirnov, A.A. (Smyrnov, A.A.)

TITLE: Study of Interatomic Interaction in Interstitial Alloys by the Wave Scattering Method (Izucheniye mezhduatomnogo vzaimodeystviya v splavakh vnedreniya metodom rasseyaniya voln)

PERIODICAL: Dopovidi Akademii Nauk Ukrains'koi RSR, 1957, Nr 5, pp. 470-473 (USSR)

ABSTRACT: The authors consider the application of the theory of X-ray scattering by interstitial alloys for determination of some constants of interatomic interaction. The data obtained make it possible to find the correlation parameters in alloys with two kinds of atoms at the lattice points and one kind in the interstitial positions by the intensity of scattered radiation and making use of Fourier calculus. The authors consider a particular case of an alloy whose lattice points are occupied by atoms A and B and form a face-centered cubic lattice and interstices are partially occupied by C-atoms. The correlation parameters enable one to estimate the micro-nonuniformities of the alloy. Formula 7 in the article can be applied to

Card 1/2

137-58-6-13104

Translation from: Referativnyy zhurnal, Metallurgiya, 1958, Nr 6, p 274 (USSR)

AUTHORS: Krivoglaz, M.A., Smirnov, A.A.

TITLE: To the Termodynamic Theory of Second-order Phase Transitions in Solid Solutions (K termodinamicheskoy teorii fazovykh perekhodov vtorogo roda v tverdykh rastvorakh)

PERIODICAL: Sb. nauchn. rabot in-ta metallofiz. AN UkrSSR, 1957, Nr 8, pp 65-69

ABSTRACT: Relationships are obtained between the second derivatives of the thermodynamic potential Φ relative to the temperature T, the pressure P, and the concentration c which are generalizations of Ehrenfest's relationships for solid solutions. Within the framework of the thermodynamic theory of second-order phase transitions, relationships of the degree of the lower-range order of η were calculated relative to P and c close to the transition point. With T and P constant, $\eta \sim \sqrt{c-c_0}$, while with T and c constant, $\eta \sim \sqrt{P-P_0}$, where c_0 and P_0 are the values corresponding to the transition curves. To determine the slope coefficient of these relationships it is necessary

Card 1/2

137-58-6-13104

To the Thermodynamic Theory (cont.)

to know the coefficients of the expansion of Φ according to powers of η, as performed in thermodynamic theory, and the derivatives $\partial T_o/\partial c$ or $\partial T_o/\partial P$, where T_o is the transition temperature.

M.K.

1. Metals--Phase studies 2. Metals--Thermodynamic properties

Card 2/2

SMIRNOV, A.A.

18(7) PHASE I BOOK EXPLOITATION SOV/2025

Krivoglaz, Mikhail Aleksandrovich, and Adrian Anatol'yevich Smirnov

Teoriya uporyadochivayushchikhsya splavov (Theory of Ordering in Alloys) Moscow, Fizmatgiz, 1958. 388 p. 5,000 copies printed.

Ed.: K.P. Gurov; Tech. Ed.: N.Ya. Murashova.

PURPOSE: This book is intended for solid-state physicists and advanced students specializing in the physics of metals.

COVERAGE: The book aims to give a systematic presentation of the more extensively investigated aspects of the theory of ordering in alloys. The phenomenon is studied from two points of view: the actual ordering of atoms, and the effect thereof on the properties of the alloy. The author states that the theory of ordering makes it possible to determine the short-and long-range order established in alloys of various compositions at different temperatures and to explain the effect of composition and heat treatment on the properties of alloys. Sufficient experimental data are included to illustrate the basic assumptions of the theory. No personalities are mentioned. There are 337 references, of which 153 are Soviet, 140 English, 31 German, 6 Japanese, 4 French, 1 Danish, 1 Dutch, and 1 Chinese.

Card 1/ 6

Theory of Ordering in Alloys SOV/2025

TABLE OF CONTENTS:

Card 2/6

Theory of Ordering in Alloys

GEYCHENKO, V.V.; KRIVOGLAZ, M.A.; SMIRNOV, A.A.

Studying atomic interaction in alloys by means of wave scattering by the crystal lattice of alloys. Issl. po zharopr. splav. 3:140-149 '58. (MIRA 11:11)

(Alloys) (Crystal lattices) (Particles, Elementary--Scattering)

DANILENKO, V.M.; KRIVOGLAZ, M.A.; MATYSINA, Z.A.; SMIRNOV, A.A.

Theory of slow neutron scattering in alloys. Issl. po zharopr. splav. 3:150-160 '58. (MIRA 11:11)
(Neutrons--Scattering) (Alloys)

SOV/181-1-9-13/31

18(0), 24(2)

AUTHORS: Smirnov, A. A., Tikhonova, Ye. A.

TITLE: On the Theory of Scattering of X-Rays and Thermal Neutrons by Multicomponent Substitution Alloys

PERIODICAL: Fizika tverdogo tela, 1959, Vol 1, Nr 9, pp 1393 - 1400 (USSR)

ABSTRACT: The authors investigated the influence exerted by geometrical lattice disturbances, caused by different atomic radii of the components, on the X-ray- and neutron scattering in disordered binary and multicomponent alloys. Special attention is devoted to the concentration dependence of the scattered radiation intensity. The investigations were conducted after the model of the Borie elastic continuum for the special case of binary alloys. Moreover, they were made on the assumption of the displacements being superposable, without considering the correlations between the substitutions of the various lattice points by atoms. Calculations are made within the kinematic scattering theory. The authors considered the scattering of a monochromatic radiation on a single crystal. First, the general theory of X-ray scattering in multicomponent alloys is developed, and this is then applied to the special cases of a

Card 1/2

On the Theory of Scattering of X-Rays and Thermal Neutrons by Multicomponent Substitution Alloys

SOV/181-1-9-13/31

binary and a ternary alloy. The formulas obtained can be used for the calculation of scattering intensity in alloys with disturbed lattice, and permit the investigation of the concentration dependence of the regular reflection and the background intensity. There are 8 references, 5 of which are Soviet.

ASSOCIATION: Institut metallofiziki AN USSR Kiyev (Institute of Metal Physics of the AS UkrSSR Kiyev)

SUBMITTED: December 30, 1958

Card 2/2

SMIRNOV, A.A. [Smyrnov, A.A.]; TIKHONOVA, Ye.A. [Tykhonova, O.O.]

Contribution to the theory of X-ray and thermal neutron scattering by multicomponent substitutional alloys. Ukr. fiz. zhur. 4 no.3:322-333 My-Je '59. (MIRA 13:2)

1.Institut metallofiziki AN USSR.
(X rays--Scattering)
(Neutrons--Scattering)
(Alloys)

SOV/126-7-1-23/28

AUTHORS: Krivoglaz, M.A. and Smirnov, A.A.

TITLE: On the Possibility of Determining the Form of the Fermi Surface From the Angular Distribution of γ-Quanta Formed in the Transformation of Electron-Positron Pairs into Photons
(O vozmozhnosti opredeleniya formy poverkhnosti Fermi po uglovomu raspredeleniyu γ-kvantov, obrazovavshikhsya pri prevrashchenii elektronno-pozitronnykh par v fotony)

PERIODICAL: Fizika Metallov i Metallovedenie, 1959, Vol 7, Nr 1, pp 151-152 (USSR)

ABSTRACT: In units of $h/2\pi$ (h being Planck's constant) the characteristic momentum vectors for the crystal lattice, electron, positron and resultant photon are denoted by $\underline{g}$, $\underline{K}$, $\underline{K}'$ and $\underline{p}$ respectively. The transition probability for pair annihilation with photon production in the lattice is then given by the standard formula:

$$W \sim \sum_{\underline{g}} \left| \int u_{\underline{K}} u^{*}_{\underline{K}'} \exp(-2\pi i \underline{g}\underline{r}) d\tau \right|^2 \delta(\underline{K} + \underline{K}' + 2\pi\underline{g} - \underline{p})$$

Card 1/3

On the Possibility of Determining the Form of the Fermi Surface From the Angular Distribution of γ-Quanta Formed in the Transformation of Electron-Positron Pairs into Photons

Here the u's are the particle wave-functions and of course involve the configuration vector $\underline{r}$; $d\tau$ is the unit of volume in configuration space; the delta-term insures the conservation of momentum. The angular distribution of γ-quanta may be obtained explicitly from this formula by writing $\underline{r}$ and its derived functions in terms of polar co-ordinates r, θ, ϕ and integrating out the redundant variables. The distribution is related to the Fermi energy surface through the lattice and particle vectors, and in principle this surface could be determined for all values of $\underline{g}$ by absolute intensity measurements of the photon distribution at a large number of angles. In practice it is feasible to make only relative intensity measurements at a few angles, and the note suggests how these angles be selected to afford the maximum possible information about the general form of the Fermi surface. In particular, the theoretical interpretation is considerably simplified for angles corresponding to the vanishing of one or other of the basic

 vectors.

SOV/126-7-1-23/28

On the Possibility of Determining the Form of the Fermi Surface From the Angular Distribution of γ-Quanta Formed in the Transformation of Electron-Positron Pairs into Photons

There are 7 references, of which 4 are Soviet and 3 English.

ASSOCIATION: Institut metallofiziki AN USSR (Institute of Metal Physics, Ac.Sc. UkrSSR)

SUBMITTED: October 7, 1957

Card 3/3

AUTHORS: Nosar', A. I. and Smirnov, A. A. SOV/126-7-6-2/24

TITLE: Theory of the Residual Electrical Resistivity of Binary Disordered Alloys with Imperfect Crystalline Lattices

PERIODICAL: Fizika metallov i metallovedeniye, 1959, Vol 7, Nr 6, pp 809-824 (USSR)

ABSTRACT: The theory of the residual electrical resistivity of disordered substitutional alloys of non-transition metals was given by Nordheim (Ref 1) in terms of the one-electron model, without any allowance for correlation and static defects of the crystal lattice. For binary alloys A-B this theory leads to a parabolic symmetrical curve which gives the dependence of the residual electrical resistivity ρ on the relative concentration c_A of the A atoms in the alloy; this curve can be expressed as

$$\rho = kc_A(1 - c_A).$$

Further developments of the theory (Refs 2,3) allowed for various factors which affect ρ. The many-electron theory of the residual resistivity was used by several workers (Refs 4-10) for binary ordering alloys. These

Card 1/3

workers allowed for correlation but not for geometric defects of the crystal lattice. The present paper deals with the effect of lattice defects due to different dimensions of the alloy atoms on the concentration dependence of the residual resistivity of binary (A-B) disordered substitutional alloys of non-transition metals. The many-electron theory of metals is used but correlation between lattice substitutions in the alloy is not allowed for. Since the treatment is qualitative, in the sense that a numerical value of the electrical resistivity is not obtained, the defects are allowed for by means of a rough "elastic-medium" model, used in discussion of X-ray scattering in alloys (Ref 14). Dependence of the residual electrical resistivity on the concentration c_A is obtained in the form

$$\rho = Ac_A(1 - c_A) + Bc_A(1 - c_A)(\alpha_o + \alpha_1 c_A) \qquad (105)$$

where α_o and α_1 are functions of $\omega_A(c_A)$ and $\omega_B(c_B)$ and ω's are mean volumes of A (or B) atoms, which depend on the

Theory of the Residual Electrical Resistivity of Binary Disordered Alloys with Imperfect Crystalline Lattices

concentrations of the A or B atoms (c_A and c_B respectively). When $\alpha_1 = 0$, i.e. the mean volume of the A atom increases linearly with the concentration c_A, the authors found that

$$\rho = A' c_A (1 - c_A), \qquad (106)$$

where $A' \neq A$. Eq (106) is the same equation as that obtained by Nordheim (Ref 1). The paper is entirely theoretical.
There are 14 references, 8 of which are Soviet, 4 English, 1 German and 1 international.

ASSOCIATION: Institut metallofiziki AN UkrSSR (Institute of Metal Physics, AS Ukrainian SSR)

SUBMITTED: February 14, 1958

24(7) SOV/48-23-5-21/31

AUTHORS: Geychenko, V. V., Danilenko, V. M., Krivoglaz, M. A., Matysina, Z. A., Smirnov, A. A.

TITLE: On the Theory of the Diffused Dispersion of an X-Ray and Slow Neutrons in Multicomponent Alloys (K teorii diffuznogo rasseyaniya rentgenovykh luchey i medlennykh neytronov mnogokomponentnymi splavami)

PERIODICAL: Izvestiya Akademii nauk SSSR. Seriya fizicheskaya, 1959, Vol 23, Nr 5, pp 637-639 (USSR)

ABSTRACT: The study of the diffused dispersion of various types of waves in the crystal lattice of alloys offers the possibility of investigating the arrangement of the various atoms in the crystal lattice and the influence exerted by microinhomogeneities upon alloy properties. A formula must be developed and expanded , permitting the computation of dispersion for the cases of X-rays and slow neutrons by the application of "factors of atomic dispersion". Such a formula (1) is written down in the form of a finite sum and the factors for the computation of the dispersion of an X-ray and of slow neutrons are described. This finite sum may be decomposed into two partial sums which consist of the diagonal or non-diagonal

Card 1/2

On the Theory of the Diffused Dispersion of an X-Ray and Slow Neutrons in Multicomponent Alloys

members, respectively. These two partial sums are then computed, namely, for the disordered state in the Brave type lattice. For an exemplification, these two formulas are written down for a binary alloy with the hexagon systems AB and AB_3. Finally, a wide space is devoted to the correlation parameters characterizing the state of the crystal. There are 4 references, 3 of which are Soviet.

ASSOCIATION: Institut metallofiziki Akademii nauk USSR
(Institute of Metal Physics of the Academy of Sciences, UkrSSR)

PHASE I BOOK EXPLOITATION SOV/5263

Smirnov, Adrian Anatol'yevich

Teoriya elektrosoprotivleniya splavov (Theory of the Electrical Resistance of Alloys) Kiyev, Izd-vo AN UkrSSR, 1960. 146 p. 4,000 copies printed.

Sponsoring Agency: Akademiya nauk Ukrainskoy SSR. Institut metallofiziki. Ed. of Publishing House: I. V. Kisina; Tech. Ed.: R. O. Buniy.

PURPOSE: This book is intended for scientific workers, metal scientists, and metal physicists. It may also be used by advanced students.

COVERAGE: The book deals with the residual electrical resistance theory of metals and alloys, developed at the Theoretical Department of the Institut metallofiziki AN UkrSSR (Institute of the Physics of Metals, AS UkrSSR). The effect of various types of crystal lattice imperfections, caused by irregular alternation

Card 1/5

Theory of the Electrical Resistance of Alloys SOV/5263

of atoms as well as by geometrical defects, on the electrical resistance of metals and alloys is examined and described. The theoretical and experimental results are compared. The author thanks M. A. Krivoglaz, A. G. Lesnik, A. F. Lubchenko, and Ye. S. Yushkova. There are 98 references: 39 Soviet, 12 German, 44 English, 1 French, and 2 others.

TABLE OF CONTENTS:

Card 2/5

DANILENKO, V.M. [Danylenko, V.M.]; KRIVOGLAZ, M.O.[Kryvohlaz, M.O.]
LARIKOV, L.N.; SMIRNOV, A.A.

Ukrainian Republic Conference on the Theory of Metals and Alloys.
Ukr. fiz. zhur. 5 no.1:130-135 Ja-F '60. (MIRA 14:6)
(Metals—Congresses)
(Alloys—Congresses)

SMIRNOV, A.A.

27946
S/185/60/005/004/004/021
D274/D306

18 1000 1418, 1530, 1413

AUTHORS: Matysina, Z.A. and Smyrnov, A.A.

TITLE: On the theory of ordering of alloys having a close-packed hexagonal lattice

PERIODICAL: Ukrayins'kyy fizychnyy zhurnal, v. 5, no. 4, 1960, 458-470

TEXT: Binary ordered alloys are considered with close-packed hexagonal lattice of type AB and AB_3. Long-range and short-range order are taken into account (the latter being characterized by the correlation between lattice points occupied by different kinds of atoms). First, ordered alloys are considered without taking into account correlation. In that case, the free energy of the alloy can be calculated by the Gors'kiy-Bragg-Williams method (Ref. 2: V.S. Gors'kiy, Z. Phys., 50, 64, 1928), (Ref. 3: W.L. Bragg, E.J. Williams, Proc. Roy. Soc., 145, 699, 1934; E. Williams, Proc. Roy. Soc., 152, 231, 1935). The expression for the degree of long-range order is

Card 1/8

given for AB-type lattices. Thereupon the free energy is found:

$$F(\eta) = E(0) - \frac{3}{2}N_0(w-w')\eta^2 + \\ + kTN_0\left[\left(c_A+\frac{1}{2}\eta\right)\ln\left(c_A+\frac{1}{2}\eta\right)+\left(c_A-\frac{1}{2}\eta\right)\ln\left(c_A-\frac{1}{2}\eta\right)+\right. \\ \left.+\left(c_B-\frac{1}{2}\eta\right)\ln\left(c_B-\frac{1}{2}\eta\right)+\left(c_B+\frac{1}{2}\eta\right)\ln\left(c_B+\frac{1}{2}\eta\right)\right]; \quad (9)$$

here E is the configurational energy, w and w' - ordering energies, $c_A = N_A/N$, $c_B = N_B/N$ (N_A, N_B being the number of atoms A and B respectively). Formulas are derived for the equilibrium value of the degree of long-range order, and for the temperature T_0 of order-disorder transition. Alloys having AB_3-type lattice yield analogous formulas. Thus, the free energy is

On the theory of ordering...

$$F(\eta) = E(0) - \frac{3}{2} N_0 (w + w') \eta^2 + \\ + 2kTN_0 \left[\left(c_A + \frac{3}{4}\eta \right) \ln \left(c_A + \frac{3}{4}\eta \right) + \left(c_B - \frac{3}{4}\eta \right) \ln \left(c_B - \frac{3}{4}\eta \right) + \right. \\ \left. + 3 \left(c_A - \frac{1}{4}\eta \right) \ln \left(c_A - \frac{1}{4}\eta \right) + 3 \left(c_B + \frac{1}{4}\eta \right) \ln \left(c_B + \frac{1}{4}\eta \right) \right]. \quad (13)$$

For the equilibrium value of η one obtains

$$\frac{2(w + w')}{kT} \eta = \ln \frac{\left(c_A + \frac{3}{4}\eta \right) \left(c_B + \frac{1}{4}\eta \right)}{\left(c_A - \frac{1}{4}\eta \right) \left(c_B - \frac{3}{4}\eta \right)}. \quad (14)$$

The order-disorder transition is a phase transition of the first order. This was experimentally confirmed by K. Jonemitsu and T. Sato (Ref. 4: J. Phys. Soc. Japan, 13, 15, 1958). Theory of order-

Card 3/8

On the theory of ordering...

ing, correlation being taken into account. From the correlation parameters, the interatomic coupling constants can be found, as well as the microinhomogeneities in alloy-composition related to short-range order; (additional qualitative results can be obtained). The ordering is considered by a quasichemical method, adopted from the references. Formulas are derived for the probabilities of the lattice points being occupied by different kinds of atoms. The free energy is expressed in terms of these probabilities. From the minimum condition of free energy, the equilibrium value of η can be found; the relationships involved are rather cumbersome; they can best be solved by electronic computers or by graphic methods. If w/kT and w'/kT are small in comparison with unity, i.e. the correlation is insignificant, the computations lead to a formula for η similar to that without correlation. The correlation parameters $\varepsilon_{\alpha\beta}^{(ij)} = p_{\alpha\beta}^{(ij)} - p_{\alpha}^{(i)} p_{\beta}^{(j)}$ which characterize the short-range order, are determined by

Card 4/8

On the theory of ordering...

$$\varepsilon^{(12)} = \varepsilon^{(12)}_{AB} = \varepsilon^{(12)}_{BA} = -\varepsilon^{(12)}_{AA} = -\varepsilon^{(12)}_{BB} =$$
$$= \frac{2p^{(1)}_A p^{(2)}_A p^{(1)}_B p^{(2)}_B \left(e^{\frac{w}{kT}} - 1\right)}{\gamma_1 + (p^{(1)}_A p^{(2)}_A + p^{(1)}_B p^{(2)}_B) e^{\frac{w}{kT}} + p^{(1)}_A p^{(2)}_B + p^{(2)}_A p^{(1)}_B}; \quad (63)$$

$$\varepsilon^{(11)} = \varepsilon^{(11)}_{AB} = -\varepsilon^{(11)}_{AA} = \varepsilon^{(11)}_{BB} =$$
$$= \frac{2p^{(1)'}_A p^{(1)'}_B \left(e^{\frac{w'}{kT}} - 1\right)}{\gamma_2 + (p^{(1)'}_A + p^{(1)'}_B) e^{\frac{w'}{kT}} + 2p^{(1)}_A p^{(1)}_B}; \quad (64)$$

$$\varepsilon^{(22)} = \varepsilon^{(22)}_{AB} = -\varepsilon^{(22)}_{AA} = -\varepsilon^{(22)}_{BB} =$$
$$= \frac{2p^{(2)'}_A p^{(2)'}_B \left(e^{\frac{w'}{kT}} - 1\right)}{\gamma_3 + (p^{(2)'}_A + p^{(2)'}_B) e^{\frac{w'}{kT}} + 2p^{(2)}_A p^{(2)}_B}, \quad (65)$$

Card 5/ 8

On the theory of ordering...

where

$$\gamma_1 = \left[(p_A^{(2)} - p_B^{(2)})^2 e^{\frac{2w'}{kT}} + 4 p_A^{(2)} p_B^{(2)} e^{\frac{w'}{kT}} \right]^{1/2}. \qquad (62)$$

Formulas (63)-(65) can be directly used for calculating the electrical resistance of the alloys, the intensity of diffuse X-ray scattering, neutron-scattering intensity, etc. In such calculations, the apriori probability in terms of degree of long-range order and component-concentration, has to be introduced in the formulas. It is noted that the equilibrium value of η (or $p_\alpha^{(i)}$) can be experimentally determined, e.g. by X-ray analysis. By such analysis the correlation parameters $\xi^{(ij)}$ can be determined, introduced in formulas (63)-(65), and then the parameters w and w' found. Further, formulas are found for the correlation parameters of disordered alloys. The kind of order-disorder transition can be ascertained by investigating the dependence of the free energy on η at various temperatures. This can be graphically done; thereby, the transition temperature can be found too. A graph is shown with the dependence of the free energy on the degree η of long-range order for the case

Card 6/8

On the theory of ordering...

$w' = -w$, (stoichiometric composition being assumed). The temperature T_0 of order-disorder transition is found from the graph: $w/kT_0 = 0.372$; this is compared with the case without correlation, for which $w/kT = 0.333$. From the graph it also follows that for hexagonal AB-type lattices, the order-disorder transition is a phase transition of the second order. For certain other values of w, e.g. $w' = 2w$, no ordering takes place in the alloy. Further, AB_3-type lattices are investigated. The expression for the free energy is

$$\frac{F}{kTN_0} = -6\left[4\sum_{\alpha} c_\alpha \frac{v_{\alpha\alpha} + v'_{\alpha\alpha}}{kT} + \frac{w}{kT}\sum_i \sum_{\alpha\neq\beta} p_{\alpha\beta}^{(i2)} + \frac{w'}{kT}\sum_i \sum_{\alpha\neq\beta} p_{\alpha\beta}^{(i2)'}\right] - \\ - 22\sum_{\alpha}(p_\alpha^{(1)} \ln p_\alpha^{(1)} + 3p_\alpha^{(2)} \ln p_\alpha^{(2)}) + 12\sum_i \sum_{\alpha\beta}(p_{\alpha\beta}^{(i2)} \ln p_{\alpha\beta}^{(i2)} + p_{\alpha\beta}^{(i2)'} \ln p_{\alpha\beta}^{(i2)'}). \quad (75)$$

As in the case of AB-type lattices, experimentally determined correlation parameters are used for finding w. A graphical investigation of the dependence of free energy on η yielded, in the particular cases $w' = w$, $w' = 2w$, $w' = -w$, no order-disorder transition.

Card 7/8

This is apparently due to the limitations of the quasichemical method of investigation used, especially in determining the long-range order. Hence further, more complex, investigations by the same method are not worthwhile in the case of lattices of AB_3-type. There are 3 figures and 10 references: 2 Soviet-bloc and 8 non-Soviet-bloc. The 4 most recent references to English-language publications read as follows: K. Jonemitsu, T. Sato, J. Phys. Soc. Japan., 13, 15, 1958; Y.Y. Li, Journ. Chem. Phys., 17, 447, 1949; Y.Y. Li, Phys. Rev., 76, 972, 1949; E.A. Guggenheim, Mixtures, Oxford, 7, 1952.

ASSOCIATION: Instytut metalofizyky AN USSR (Institute of Metalphysics AS UkrSSR)

SUBMITTED: December 8, 1959

SMIRNOV, A.A.; TIKHONOVA, Ye.A.

Investigating geometric distortions of the crystal lattice of alloys by the scattering of X rays and thermal neutrons. Issl. po zharopr. splav. 6:136-139 '60. (MIRA 13:9)
(Alloys--Metallography) (Crystal lattices)

MATYSINA, Z.A.; SMIRNOV, A.A.

Ordered alloys with a hexagonal closely-packed crystal lattice.
Issl. po zharopr. splav 6:146-157 '60. (MIRA 13:9)
(Alloys—Metallography) (Crystal lattices)

24.7700 2407, 1160, 1137

S/126/60/010/006/002/022
E201/E491

AUTHORS: Nosar', A.I. and Smirnov, A.A.

TITLE: The Theory of the Residual Electrical Resistance of Multicomponent Ordering Alloys With Allowance for Lattice Distortions Due to Differences in Dimensions of Atoms

PERIODICAL: Fizika metallov i metallovedeniye, 1960, Vol.10, No.6, pp.807-817

TEXT: The theory of the residual electrical resistance of ordering alloys of non-transition metals was dealt with by several workers (Ref.1 to 4) without allowance for the lattice distortions. The present paper discusses the effect of the lattice distortions (due to differences in dimensions of component atoms) on the residual electrical resistance of multicomponent substitutional alloys of non-transition metals, which are capable of ordering. The residual resistance is considered as a function of composition and long-range order parameters. Correlation between substitution effects is neglected. An allowance for the lattice distortions is made using an elastic medium model (Ref.7). The authors derive the following equation for the residual

S/126/60/010/006/002/022
E201/E491

The Theory of the Residual Electrical Resistance of Multicomponent Ordering Alloys With Allowance for Lattice Distortions Due to Differences in Dimensions of Atoms

resistance of multicomponent disordered alloys:

Eq. (33)
RDP 813

$$\rho = \sum_{\substack{\alpha,\alpha'=1 \\ (\alpha<\alpha')}}^{\zeta} A_{\alpha\alpha'} c_\alpha c_{\alpha'} + \sum_{\alpha=1}^{\zeta} A_\alpha c_\alpha b_\alpha + A \sum_{\alpha=1}^{\zeta} c_\alpha b_\alpha^2 \qquad (33)$$

где $A_{\alpha\alpha'}$, A_α и A — не зависящие от состава коэффициенты.

Here $A_{\alpha\alpha'}$, A_α and A are coefficients independent of composition; c_α represents concentration; b_α is a function of the change of the atomic volume (volume per atom) due to different types of atoms being present; ζ is the number of different types of atoms. This general equation is applied to ternary disordered alloys. The case of binary ordering alloys is

Card 2/3

GEYCHENKO, V.V.; SMIRNOV, A.A.

Theory of ordering of Fe_3Al-type alloys. Sbor. nauch. rab. Inst. metallofiz. AN URSR no.11:36-40 '60. (MIRA 13:11)
(Iron-aluminum alloys--Metallography)
(Crystal lattices)

18(0), 24(0)

S/053/60/070/01/006/007
B006/B017

AUTHORS: Danilenko, V. M., Krivoglaz, M. A., Larikov, L. N., Smirnov, A. A.

TITLE: Congress of the Ukrainian Republic on the Theory of Metals and Alloys

PERIODICAL: Uspekhi fizicheskikh nauk, 1960, Vol 70, Nr 1, pp 191-198 (USSR)

ABSTRACT: This Conference which took place from 1 - 5 June, 1959 in Kiyev was attended by scientists from the Ukraine and from other Republics of the Union; 70 lectures were delivered and discussed in 2 plenary meetings in 2 sections (electron theory and molecular-kinetic theory of metals and alloys). The problems and prospects of metal theory in the light of the fulfillment of the Seven-year Plan and the phenomenological theory of ferromagnetism were summarized in 2 lectures by I. M. Lifshits and S. V. Vonsovskiy. The following lectures were also delivered: V. P. Silin on the investigation of the influence of the interaction between the conduction electrons on the metal properties by the aid of the theory by L. D. Lan-

Card 1/9

dau; I. M. Lifshits and V. G. Peschanskiy on the galvanomagnetic characteristics of metals with open Fermi surfaces in strong magnetic fields; in this connection a paper by Lifshits, M. Ya. Azbel', and M. I. Kaganov on the relations between the asymptotic behavior of these characteristics and the topology of the Fermi surface were analyzed, the resistance change in the magnetic field was (depending on the direction) found to increase quadratically or to approach a saturation value, according to the law by P. L. Kapitsa, however, the increase should be linear. M. Ya. Azbel' reported on results of the quantum theory of the electric high-frequency resistance which he set up; M. Ya. Azbel' and E. A. Kaner investigated the cyclotron resonance in metals in the region of the anomalous skin effect in magnetic fields by the aid of the aforementioned theory; M. I. Kaganov investigated the case of a non-quadratic dependence of the electron energy on the impulse; Yu. A. Bychkov, L. E. Gurevich, and G. M. Nedlin reported on the thermomagnetic effect in strong magnetic fields; A. A. Smirnov and M. A. Krivoglaz on a determination of the shape of the Fermi surface in metals via a determination of the total

momenta of the photon pairs which are formed in the annihilation of positrons and conduction electrons; A. M. Kosevich on a theory of the influence exercised by elastic deformation on the energy spectrum of the electrons in the metal and on the oscillation of magnetic susceptibility; B. I. Berkin and I. M. Dmitrenko on the results of an experimental investigation of the influence of a compression from all sides on the anisotropy and the de Haas-Van Alfen effect in crystals of weakly magnetic metals; V. L. Gurevich on sound absorption in the magnetic field in the case of an arbitrary law of dispersion; G. L. Kotkin on sound absorption in metals for arbitrary Fermi surfaces; A. A. Galkin and A. P. Korolyuk on the experimental determination of fluctuations of the ultrasonic absorption coefficient in the magnetic field for tin and zinc; M. A. Krivoglaz and Ye. A. Tikhonova on the theory of X-ray- and slow neutron scattering in solid solutions; V. I. Iveronova and A.A. Katsnel'son on the theory of the intensity distribution of diffused scattering; M. A. Krivoglaz on the scattering of X-rays and of thermal neutrons; A. A. Smirnov and Ye. A. Tikhonova on the concentration dependence of the intensity of regular

reflection and of the background of scattered X-rays; V. M. Danilenko on dislocations in ordered alloys; A. N. Men' and A. N. Orlov on the computation of the maximum oscillation frequency of the atoms of a binary solid solution with cubic body-centered lattice; A. P. Zvyagina and V. I. Iveronova on the dependence of the characteristic Debye temperature of an alloy on the form of the spectrum of the thermal vibrations of the atoms; K. B. Vlasov on the rotation of the polarization plane of elastic transversal waves which propagate in a metal along the direction of the magnetic field; A. A. Berdyshev and B. V. Karpenko on the interaction of the inner electrons by means of conduction electrons; B. V. Karpenko and A. A. Berdyshev on the interaction of conduction electrons and spin waves in an antiferromagnetic; L. M. Petrova and Yu. P. Irkhin on the computation of Hall's constant of a ferromagnetic metal within the framework of the s-d exchange model by Vonsovskiy; P. S. Zyryanov, T. G. Izyumova, and G. V. Skrotskiy on the electric resistance of ferromagnetic metals in the radiofrequency range near the ferromagnetic resonance; Yu. A. Izyumov and

G. V. Skrotskiy on the magnetic spin resonance of conduction electrons; A. I. Gubanov on ferromagnetism in amorphous ferromagnetics; M. Ya. Azbel', V. I. Gerasimenko, and I. M. Lifshits on paramagnetic resonance in metals if the skin depth is very small compared to the sample dimensions; V. P. Silin on a macroscopic theory of the optical effects in metals in the range of the normal and of the anomalous skin effect. S. V. Konstantinov and V. I. Perel' on the conductivity and the magnetic susceptibility of a metal in the variable electromagnetic field in taking into account three-dimensional dispersion; B. A. Grinberg and A. N. Orlov on the resistance change in the magnetic field and the Hall effect in a pure metal; A. A. Smirnov and A. I. Nosar' on a theory of the electric resistance of alloys with distorted lattice within the framework of the many-electron model of metal; G. V. Samsonov and V. S. Neshpor on the conductivity of Mo_3Si and $MoSi_2$; G. V. Samsonov and Yu. B. Paderno on the investigations of the physical properties and the electron configuration of rare earth hexaborides; V. Ye. Mikryukov on the experimental results

concerning the Wiedemann-Franz law in metals and alloys; G. Ye. Pikus and V. B. Fiks on the electrotechnical effects in liquid metals; I. B. Borovskiy and K. P. Gurov on the influence of impurities on the physical properties of transition metals; M. I. Korsunskiy and G. P. Borovikova on the influence of impurities on the X-ray spectra of solids; I. M. Lifshits on a new type of phase transitions in metals at high pressures; I. M. Lifshits and G. I. Stepanova on a method of describing solutions by the introduction of correlation functions for the atom groups; B. N. Finkel'shteyn on the thermodynamics of a three-component solid solution; Z. A. Matysina and A. A. Smirnov on the theory of the ordering of alloys with hexagonal closely packed lattice; I. A. Gindin, B. G. Lazarev, Ya. D. Starodubov, and V. I. Khotkevich on the existence of low-temperature isomorphic transformations of a series of metals (alkali, Bi, Be); I. M. Lifshits and V. V. Slezov on the coagulation of particles in the late stage of decay; R. I. Garber on the kinetics of pore formation in rock salt crystals; V. I. Vladimirov on the theory of coagulation of

surplus vacancies in a solid; B. Ya. Lyubov and A. L. Roytburd on the theory of the growth of martensite crystals; L. N. Larikov on the kinetics of the recrystallization in deformed metals and alloys; I. V. Salli on the problem of the lines of the metastable equilibrium in the diagrams of binary systems; M. I. Zakharova and I. N. Stetsenko on phase transformations in iron-vanadium alloys; K. P. Gurov on the relation between the activation energy of self-diffusion with the characteristic temperature of pure metals; I. M. Fedorchenko and A. I. Raychenko on the volume increase in heating mixed powders; Ye. A. Tikhonova on the diffusion theory of interstitial atoms in alloys of the CuAu type; V. B. Fiks on the mobility mechanism of the impurity ions in metals in an electric field; P. P. Kuz'menko and Ye. I. Khar'kov on experimental investigations of charge transfer in pure metals by means of tracer atoms; I. N. Frantsevich, D. F. Kalinovich, I. I. Kovenskiy, M. D. Smolin, and M. D. Glinchuk on investigations of the mutual charge transfer of both components in binary solid

solutions of C, Cr, Mo, and tungsten in iron by means of radioactive isotopes; I. A. Oding and V. N. Geminov on the destruction of metals in creeping at increased temperatures; I. A. Oding and L. K. Gordiyenko on the variation of the mechanical properties of the metals with preceding creeping test; B. Ya. Pines on characteristics of the diffusion mechanism in creeping; N. S. Zhurkov and A. V. Savitskiy on the experimental verification of the diffusion theory in the mechanical destruction in pure silver and in an Ag + 5% Al alloy; N. S. Fastov on the thermodynamics of irreversible processes in the deformation of metals; V. I. Khotkevich obtained the same results in this respect; A. I. Gindin communicated data on the increase of the plasticity of armco iron at low temperatures by preceding plastic deformation at higher temperatures. Yu. M. Plishkin reported on the stable configurations of atomic layers in expanding cylindrical crystals into the direction of the axis. K. P. Rodionov reported on the anomalous change of physical properties of a solid in a temperature range which, in general, does not coincide with the melting temperature.

Congress of the Ukrainian Republic on the Theory of Metals and Alloys

S/053/60/070/01/006/007
B006/B017

N. I. Barich on the rules governing the periodic change of the interatomic binding forces as depending on the position of the elements in the periodic system by D. I. Mendeleyev. G. M. Vorob'yev on the measurement of the intensity of X-ray interferences in the case of texturated samples. A. S. Viglin also spoke about problems of texture.

Card 9/9

SMIRNOV, A.A.; TIKHONOVA, Ye.A.

Theory of X-ray scattering by ordering alloys with distorted lattices.
Fiz.tver.tela 3 no.4:1238-1248 Ap '61. (MIRA 14:4)

1. Institut metallofiziki AN USSR, Kiyev.
(X rays—Scattering) (Crystal lattices) (Alloys)

NOSAR', A.I. [Nosar, O.I.]; SMIRNOV, A.A. [Smyrnov, A. A.]

Theory of residual electric resistance of multicomponent ordered alloys, taking into account the distortions of the crystal lattice caused by differences in atomic size. Ukr. fiz. zhur. 6 no.2:216-228 Mr-Ap '61. (MIRA 14:6)

1. Institut metallofiziki AN USSR, g. Kiyev.
(Alloys--Electric properties)
(Crystals--Defects)

S/126/61/012/005/001/028
E039/E135

AUTHORS: Nosar', A.N., and Smirnov, A.A.

TITLE: The theory of residual electrical resistances of alloys with body centred cubic lattice, and having two transition temperatures

PERIODICAL: Fizika metallov i metallovedeniye, v.12, no.5, 1961, 630-635

TEXT: The dependence of the residual electrical resistance on composition and other parameters is studied for alloys with body centred cubic lattices, and with two transition temperatures. The theory is compared with experiment and shows reasonable agreement over the limited range of observations available. The case of the binary substitution alloys A-B such as Fe-Al is examined. The form of the temperature dependence of the residual electrical resistance on concentration is shown in Fig.2 (the continuous curves are theoretical). The dependence of the residual electrical resistance on the annealing temperature is also considered for alloys of the type A_3B. The theoretical curve shows two transition temperatures at ~880 °K and 1320 °K. This is

Card 1/3 2

compared with experimental data obtained by annealing the alloy Fe_3Al at various temperatures, quenching and then measuring its resistance at -195 °C. This data only extends to the first transition but confirms the general form of the curve over that range. There are 3 figures and 15 references: 12 Soviet-bloc and 3 non-Soviet-bloc. The English language references read:

Ref.11: C. Sykes, H. Evans. J. Iron and Steel Inst., 1935, v.131, 389.
Ref.12: W.D. Bennett. J. Iron and Steel Inst., 1952, v.171, 373.
Ref.15: R.W. Cahn and R. Feder. Phil. Mag., 1960, 5, 451.

ASSOCIATION: Institut metallofiziki AN UkrSSR
(Institute of Physics of Metals, AS Ukr.SSR)

SUBMITTED: March 27, 1961

42433

S/849/62/000/000/009/016
A006/A101

AUTHORS: Matysina, Z. A., Smirnov, A. A.

TITLE: On the theory of electric resistivity of ordering alloys of transition with non-transition metals

SOURCE: Vysokotemperaturnyye metallokoeramicheskiye materialy, Inst. metalloker. i spets. spl. AN Ukr.SSR., Kiev, Izd-vo AN. Ukr.SSR., 1962 84 - 86

TEXT: To complete N. Mott's and H. Jones' studies (1936) on residual electric resistivity of disordered alloys composed of transition and non-transition metals, the authors developed a theory which can also be applied to alloys in ordered state. An analysis is made of an alloy of transition metal A with relative atomic concentration C_A, and non-transition metal B with C_B concentration, having in disordered state a Brave crystal lattice and two sorts of lattice points in ordered state. The potential energies of conductivity electrons V_A and V_B in fields of A and B ions, forming the crystal lattice of the alloy, are close. The following two formulae are derived: for determining the specific resistivity ϱ_o of the alloy:

Card 1/3

On the theory of electric resistivity of....

$$\rho_o = [C_o + C^1(P - C_B)^2]^2 \left[C_B(1 - C_B) - \frac{\nu}{1 - \nu}\gamma^2\eta^2\right] \quad (5)$$

for $C_B \leqslant P$ and

$$\rho_o = C^2 \left[C_B(1 - C_B) - \frac{\nu}{1 - \nu}\gamma^2\eta^2\right] \quad (6)$$

for $C_B \geqslant P$. Here η is the degree of the long-range order; γ is the relative concentration of lattice points of the first kind, $\gamma = \frac{1 - \nu}{\nu} C_A$ for $C_A \leqslant \nu$ and $\gamma = C_B$ for $C_A \geqslant \nu$. The values C, C' and ρ do not depend upon C_B and η. These formulae explain qualitatively the peculiarities of electric resistivity in alloys of transition with non-transition metals, which were experimentally observed. The theoretical data are compared with experimental results obtained for Pd-Cu, Pd-Ag and Pd-Au. The dependence curves of ρ_o versus the composition of disordered alloys are asymmetrical with a maximum shifted toward the side of higher concentrations of the transition metal. For ordered alloys the formula

Card 2/3

MATYSINA, Z.A.; NOSAR', A.I.; SMIRNOV, A.A.

Electric resistance of ordered alloys with a close-packed hexagonal crystal lattice. Sbor. nauch. rab. Inst. metallofiz. AN URSR no.14:121-125 '62. (MIRA 15:6)
(Crystal lattices) (Alloys--Electric properties)

S/181/62/004/001/013/052
B125/B104

AUTHORS: Smirnov, A. A., Tikhonova, Ye. A., and Chalyy, A. V.

TITLE: Effect of lattice irregularities caused by the different atomic radii in ordered binary solutions upon the intensity of scattered X rays

PERIODICAL: Fizika tverdogo tela, v. 4, no. 1, 1962, 77 - 85

TEXT: In previous work (FTT, 3, 1238, 1961) the authors have derived the general formula

$$I_{sp.} = 8\pi^3 N_0 \left| \sum_{n=1}^{\mu} f_n e^{i\mathbf{q}\mathbf{b}_n} e^{-\frac{M_n}{2}} \right|^2 \prod_{j=1}^{3} \sum_{gj} \delta(\gamma_j - 2\pi g_j). \qquad (1)$$

for the intensity of regularly reflected X rays. N_0 is the number of elementary cells in the ordered alloy, μ - number of lattice sites in the

Card 1/4

Effect of lattice irregularities ...

$$F_{стр.}=4\bar{f}_0\left[1-\frac{1}{2}e^2Q_q\left(c_Ac_B-\frac{3}{16}\eta^2\right)\right]- \qquad (15),$$
$$-\frac{1}{8}(f_A-f_B)e^2(Q_q-4Q_{1q})\left(\frac{1}{2}\eta+c_A-c_B\right)\eta^2,$$

where $\bar{f}_o = c_Af_A + c_Bf_B$. c_A and c_B are the concentrations of the components A and B. The Q's and Q_q's are found from

$$M_z=\sum_{\alpha=1}^{n}\sum_{\kappa'=1}^{p}p_\alpha^{(\kappa')}b_{\alpha\kappa'}^2Q_q^{\kappa'\kappa}, \qquad (3)$$

$$Q_q^{\kappa'\kappa}=\sum_{\rho_{\kappa'\kappa}\neq 0}\frac{(q\rho_{\kappa'\kappa})^2}{\rho_{\kappa'\kappa}^6}, \qquad (4)$$

taking into account the symmetries of a cubical face centered lattice. The $\vec{\rho}_{\kappa'\kappa}$ are the vectors connecting the sites κ' with the sites of the sublattice κ. $b_{\alpha\kappa}$ characterizes the lattice irregularities. The factor $4\bar{f}_o$

Card 3/4

KOLOMIYETS, I.D. [Kolomiiets', I.D.]; SMIRNOV, A.A.

Theory of the residual resistivity of a binary disordered alloy of periodically varying composition. Ukr.fiz.zhur. 7 no.11:1195-1204 N '62. (MIRA 15:12)

1. Kiyevskiy gosudarstvennyy universitet im. Shevchenko.
(Alloys) (Electric resistance)

S/126/62/013/003/001/023
E091/E135

AUTHORS: Geychenko, V.V., Danilenko, V.M., and Smirnov, A.A.

TITLE: Theory of ordering in alloys having a body-centred cubic lattice, in which some super-lattice can form

PERIODICAL: Fizika metallov i metallovedeniye, v.13, no.3, 1962, 321-332

TEXT: To evolve an ordering theory for alloys with more than one distant order parameter presents considerable mathematical difficulties. However, by considering ordering processes in alloys with a body-centred cubic lattice, the authors prove in this paper that full determination of such systems is not necessary for the derivation of conclusions on the temperature and type of phase transformations. The theory was constructed in terms of a Gorskiy-Bragg-Williams model and by taking into consideration the interaction of atoms in two coordinate spheres; the possibility of the formation of four types of loops was accepted a priori. The authors show that the construction of an ordering theory in which the interaction

Card 1/3

Theory of ordering in alloys ... S/126/62/013/003/001/023
E091/E135

ASSOCIATION: Institut metallofiziki AN USSR
(Institute of Physics of Metals, AS UkrSSR)

SUBMITTED: June 21, 1961

Card 3/3

S/126/62/014/002/001/018
E032/E514

24,7700

AUTHORS: Kolomiyets, I.D. and Smirnov, A.A.

TITLE: Theory of residual resistivity of a binary unordered alloy with a periodically varying composition. II

PERIODICAL: Fizika metallov i metallovedeniye, v.14, no.2, 1962, 161-164

TEXT: Part I of this paper was given in v.14, no.1 of this journal (pp 3-9). Part I was concerned with the residual resistivity of a binary unordered alloy whose composition varies sinusoidally in one of the coordinates. In the present paper this is generalised to the case where the concentrations of the components are arbitrary periodic functions of one of the coordinates. The calculations are based on the same assumptions as in part I. It is shown that the expression for ρ_o is

$$\rho_o = A\left[c_A^o\,(1 - c_A^o) - \overline{(\delta c_A)^2}\right] \qquad (8)$$

where A is a coefficient which is independent of the composition,

Card 1/2 * NOT SELECTED FOR ABSTRACTION

S/126/62/014/003/002/022
E032/E314

AUTHORS: Danilenko, V.M. and Smirnov, A.A.

TITLE: Order theory for ferromagnetic alloys. I

PERIODICAL: Fizika metallov i metallovedeniye, v. 14, no. 3, 1962, 337 - 347

TEXT: Since the degree of order in an alloy has a considerable effect on its magnetic properties, one theoretical approach has been to assume that the atoms are distributed in space with a certain order and determine the magnetic properties. However, the reverse process, i.e. the effect of the setting-up of spontaneous magnetization on the degree of order in the disposition of the atoms is also important. The aim of the present work was to obtain more detailed information on these two effects. The discussion is confined to binary alloys A-B with a body-centred cubic lattice of the β-brass type. It is assumed that each atom has a single "magnetic electron" and that the interactions responsible both for the ordering and magnetism may be localized to the first coordination sphere. Correlation in the disposition of atoms is not taken into account in the

Card 1/2

NOSAR', A.I.; SMIRNOV, A.A.

Theory of residual electric resistance in ordered $AuCu_3$-type alloys with a distorted crystal lattice. Sbor. nauch. rab. Inst.metallofiz. AN URSR no.16:44-47 '62. (MIRA 16:5)
(Gold-cppper alloys--Electric properties)
(Crystal lattices)

DANILENKO, V.M.; SMIRNOV, A.A.

Theory of the ordering of ferromagnetic alloys. Sbor. nauch. rab. Inst. metallofiz. AN URSR no.17:3-24 '63. (MIRA 17:3)

SMIRNOV, A.A.

Theory of the electric resistance of ordered alloys; review. Ukr. fiz. zhur. 8 no.2:151-156 F '63. (MIRA 16:2)

1. Institut metallofiziki AN UkrSSR, Kiyev.
(Alloys) (Electric resistance)

S/185/63/008/002/011/012
D234/D308

AUTHORS: Zyuganov, A. N., Molodkin, V. B., Smirnov, A. A. and Tikhonova, Ye. A.

TITLE: Effect of lattice distortions on scattering of slow neutrons in alloys

PERIODICAL: Ukrayins'kyy fizychnyy zhurnal, v. 8, no. 2, 1963, 256-263

TEXT: A theoretical investigation of the intensity of neutron scattering in alloys with body-centered cubic lattice of ß-brass type and with face-centered cubic lattice of AuCu and $AuCu_2$ type. The case of one scattering amplitude being negative is discussed in detail, and conditions are established for which $F^2_{str} - 4\overline{A}^2_0$ is positive. Conclusions: The fact that lattice distortions decrease the intensity of regular structural reflections when both amplitudes have the same sign, is taken into account. An increase of intensity

Card 1/2

Effect of lattice ...

S/185/63/008/002/011/012
D234/D308

is possible in some intervals of concentrations when one of the amplitudes is negative. The intensity of superstructural reflections can increase in both cases. Formulas for the intervals of concentrations are given. There are 2 figures.

ASSOCIATION: Institut metallofiziki AN USSR (Institute of Metal Physics, AS UkrSSR), Kiev

Card 2/2

S/126/63/015/002/006/033
E039/E420

AUTHORS: Danilenko, V.M., Rizdvyanetskiy, D.R., Smirnov, A.A.

TITLE: The ordering of ferromagnetic alloys with a face-centered cubic lattice

PERIODICAL: Fizika metallov i metallovedeniye, v.15, no.2, 1963, 194-202

TEXT: The question of the effect of ordering and magnetization in the case of ferromagnetic alloys with a volume centered cubic lattice was studied previously. In this paper an analogous theory of ordering in ferromagnetic binary alloys A-B with a facecentered cubic lattice is developed. It is assumed that the structure of the alloy does not change with temperature and the possibility of disintegration is not taken into account. In addition for each atom of the alloy there must be one 'magnetic' electron responsible for the magnetic properties of the alloy. Correlation between atoms and also the spin of the 'magnetic' electrons is neglected. The free energy of all systems is expressed as the sum of two terms; the free energy of the configuration F_1 (without exchange interactions) and the free energy of the 'magnetic' electrons F_2

Card 1/2

$$F = F_1 + F_2$$

S/126/63/015/002/006/033
E039/E420

The ordering of ferromagnetic ...

The equilibrium equations of the system are investigated by the use of differential geometry and expressions are derived for the temperatures of magnetization and ordering as a function of composition. The form of the results is largely governed by the value of a term α which defines the interaction processes in ordering and magnetization

$$\alpha = 2A_{AB} - A_{AA} - A_{BB}$$

where A_{AA}, A_{BB} and A_{AB} are exchange distances between neighboring atoms A-A, B-B and A-B. When $\alpha > 0$ magnetization increases the temperature for the order-disorder transition and ordering increases the Curie temperature. The converse is true when $\alpha < 0$. Curves showing the concentration dependence of the Curie point in the ordered state at $\alpha = 0$ are represented by straight lines but when $\alpha \neq 0$ they deviate from the linear relationship. There are 3 figures.

ASSOCIATION: Institut metallofiziki AN USSR (Institute of Physics of Metals AS UkrSSR)

SUBMITTED: July 21, 1962

Card 2/2

L 15560-63 EWT(1)/EWP(q)/EWT(m)/BDS/ES(s)-2 AFFTC/ASD/SSD
Pt-4 JD

ACCESSION NR: AP3004584 S/0126/63/016/001/0003/0012

AUTHORS: Danilenko, V. M.; Rizdvyanetskiy, D. R.; Smirnov, A. A. 66 65

TITLE: Ordering of ferromagnetic and antiferromagnetic alloys

SOURCE: Fizika metallov i metallovedeniye, v. 16, no. 1, 1963, 3-12

TOPIC TAGS: alloy, ferromagnetic, antiferromagnetic, ordering

ABSTRACT: This is a discussion concerning the development of a statistical theory of atom ordering and magnetization. The theory encompasses both ferromagnetic and antiferromagnetic alloys with cubic space lattice of the type β-brass. Simultaneous consideration of these two alloy types is believed to be important because of the possible existence of ferro- and antiferromagnetic orders of spins in alloys with different metal concentrations. The calculations were limited to binary alloys A-B. It was assumed that each atom of the crystal has one "magnetic" electron. The distribution and correlation of atoms and spins of "magnetic" electrons were disregarded, and the calculations were limited to the interaction of the nearest atoms. The relation between the ordering and magnetization processes was studied, the temperatures of phase transformation

Card 1/2

GAL'PERIN, F.M.; DEMIN, V.F.; SMIRNOV, A.A.; KHESTANOV, R.Kh.

Nuclear magnetic resonance in nickel. Izv. AN SSSR. Ser. fiz. 27 no.12:1458-1459 D '63. (MIRA 17:1)

MATYSINA, Z.A.; SMIRNOV, A.A.

Theory of the ordering of alloys with a lattice parameter depending on the composition and degree of order. Sbor.nauch.trud. Inst. metallofiz. AN URSR no.19:136-147 '64. (MIRA 18:5)

RYZHKOV, V.I.; SMIRNOV, A.A.

Effect of pressure on the ordering of alloys. Fiz.met. i metalloved. 18 no.5:670-677 N '64. (MIRA 18:4)

1. Institut metallofiziki AN UkrSSR.

L 31506-66 EWT(m)/T/EWP(t)/ETI IJP(c) JD/GD

ACC NR: AT6010586 SOURCE CODE: UR/0000/65/000/000/0022/0029

51
Br1

AUTHOR: Kanyuka, A.K.; Ryzhkov, V.I.; Smirnov, A.A.

ORG: Institute of Metal Physics, AN UkrSSR (Institut metallofiziki AN UkrSSR)

TITLE: Effect of pressure on the ordering of alloys having an $AuCu_3$ type cubic lattice

SOURCE: AN UkrSSR. Fazovyye prevrashcheniya v metallakh i splavakh (Phase transformations in metals and alloys). Kiev, Naukova dumka, 1965, 22-29

TOPIC TAGS: gold alloy, copper alloy, high pressure, ordered alloy, phase transition

ABSTRACT: The paper deals with the effect of pressure on ordering in $AuCu_3$-type alloys, in which the transition to the ordered state is a first-order phase transition. Theoretical analysis of the equilibrium conditions in a binary alloy A-B of this type shows that the pressure does not affect the magnitude of the jump in the degree of long-range order at the transition point; pressure only shifts the transition point T_0 to lower or higher values. Analysis of the effect of pressure on the degree of long-range order is also carried out for an alloy of stoichiometric composition. It is pointed out that for many metals and alloys, the decrease of compressibility with pressure becomes appreciable at pressures of about 10^4—10^5 atm. The qualitative conclusions drawn in the paper concerning the possibility of a nonmonotonic change in the transition point and in the degree of long-range order with

Card 1/2

RIZDVYANETSKIY, D.R.; SMIRNOV, A.A.

Magnetic elastic scattering of slow neutrons in alloys. Fiz.met. i metalloved. 20 no.2:193-198 Ag '65. (MIRA 18:9)

1. Institut metallofiziki AN UkrSSR.

L 6340-66 EWT(m)/EWP(i)/EWP(t)/EWP(b) IJP(c) JD

ACCESSION NR: AP5019881 UR/0181/65/007/008/2536/2538

AUTHOR: Britsyn, K. I.; Volkov, B. A.; Matveyev, V. V.; Smirnov, A. A. 59

TITLE: Effect of electric field on the position of the optical absorption edge in polycrystalline CdS layers

SOURCE: Fizika tverdogo tela, v. 7, no. 8, 1965, 2536-2538

TOPIC TAGS: cadmium sulfide, absorption edge, temperature dependence, electric field, forbidden band, polycrystal

ABSTRACT: The authors investigated the effect of the electric field and the dimensions of the crystallites on the position of the absorption edge in cadmium sulfide films obtained by vacuum evaporation. The apparatus used was similar to that employed by one of the authors earlier (Britsyn, with V. S. Vavilov, Opt. i spektr. v. 6, 861, 1960), except that the resolution and the sensitivity were increased. The results show that for films with crystal dimensions $a > 100$ Å the edge of the optical absorption is weakly pronounced, but when $a \sim 1$--3 μ, the absorption curve is similar to that for bulky single crystals, but is shifted in the long-range region. The temperature coefficient determined from this ratio $dE_g/dT \sim 10^{-4}$ ev/deg, agrees with data for single crystals. An ac field of 5×10^3 v/cm with frequency 16 cps shifted the absorption range in the region of $\lambda = 5100$ Å by an

Card 1/2